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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08 866,129	05/30/1997	TOSHIYA UEMURA	E97-121-USCONT2	9340

7590 06/10/2003

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EXAMINER

WILLE, DOUGLAS A

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 06/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

08/866,129

Applicant(s)

UEMURA ET AL

Examiner

Douglas A Wille

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-14,20-28 and 30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-15,20-28 and 30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 34
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 12 – 14, 21, 27, 28 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Nakamura et al. ('422)
3. With respect to claims 12 - 14, Nakamura et al. ('422) show a group III compound semiconductor device (see Figure 1) with a p-type upper layer 13 and an electrode consisting of a layer of Ni with a layer of Au on top (column 5, line 49). Figure 7 shows a modification of the Figure 1 device which has a contact layer 15 and a bonding pad 17 that covers part of layer 15 and has a protective film of silicon oxide (column 10, line 26). The other properties in claim 12 are inherent in the materials. The limitations of claims 28 and 30 are inherent in the process shown. With respect to claim 27, note that the composition of the atmosphere is a processing limitation and carries no weight in claims drawn to a device
4. With respect to claim 21, Nakamura ('422) shows a structure with an AuNi layer covering part of a Ni and Au layer and will inherently have the same properties as claimed.

Claim Rejections - 35 USC § 103

5. Claims 1, 2, 4 - 11, 20 and 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al. ('422) in view of Manabe et al. and Nakamura et al.('350).
6. With respect to claims 1 and 22, Nakamura et al. ('422) show a group III compound semiconductor device (see Figure 1) with a p-type upper layer 13 and an electrode consisting of a layer of Ni with a layer of Au on top (column 5, line 49). Figure 7 shows a modification of the

Figure 1 device which has a contact layer 15 and a bonding pad 17 that covers part of layer 15 and has a protective film of silicon oxide (column 10, line 26). Nakamura et al. ('422) show that the electrode layers are transparent (column 6, line 31). Nakamura et al. ('422) also show that the bonding pad 17 is composed of Ni and Au but teach against the use of Al (in a two layer structure) since it can migrate to the electrode and can degrade it. Manabe et al. show the use of Al in a multilayer electrode stack (see Figure 6 and column 5, line 38) which has improved operating characteristics. It would have been obvious to modify the Nakamura et al. ('422) device to include the Al layer as taught by Manabe et al. with the expectation that the two intervening layers will protect the electrode from deterioration. Nakamura et al. ('422) also teach annealing at 600 degrees (column 7, line 38) and teach the LED compound is $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$. Nakamura et al. ('350) show that the silicon oxide protective layer is SiO_2 (column 34, line 66). Note that no undercutting is shown. The remainder of the claimed features are inherent in the choice of materials. Forming the layers in the sequence Ni-Au-Al follows the decreasing sequence of work functions and would also be obvious.

7. With respect to claims 2, 5, and 23, Ni is shown as the first layer.
8. With respect to claims 4 and 25, the protective film is silicon oxide.
9. With respect to claims 6, 7, 8 and 24, the first layer, Ni has a lower ionization potential and the second layer is Au and relative diffusion is inherent in the structure.
10. With respect to claim 9, although it is a processing limitation, it is noted that annealing at 600 degrees is shown.
11. With respect to claim 10, AlGaInN is shown.
12. With respect to claim 11, a LED is shown.

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13. With respect to claim 20, Nakamura ('422) shows a structure with an AuNi layer covering part of a Ni and Au layer and will inherently have the same properties as claimed

14. With respect to claim 22, the adhesiveness is inherent in the structure.

15. With respect to claims 26, Ni is shown as the first layer and Al is the third.

Response to Arguments

1. Applicant's arguments filed 12/19/01 have been fully considered but they are not persuasive.

2. Applicant states that the limitation of annealing in oxygen should be given patentable weight but it has not been shown that the result is a unique structure.

3. Applicant states that the references do not show a high resistance layer but the same process will produce the same results.

4. Applicant states that the references teach away from the use of Al. However, note that Nakamura et al. ('422) assume that the Al will be used directly on the substrate and express concern for diffusion of Al. Manabe et al. show the use of Al in a multilayer stack that shows improved operation. Thus the intervening layers provide isolation.

Conclusion

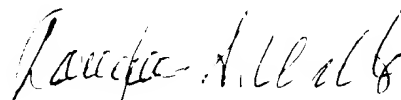
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A Wille whose telephone number is (703) 308-4949. The examiner can normally be reached on M-F (6:15-2:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Douglas A. Wille
Primary Examiner

daw
June 5, 2003